MASTERVOLT

USERS MANUAL / GEBRUIKERSHANDLEIDING / BETRIEBSANLEITING
MANUEL D'UTILISATION / MANUAL DE UTILIZACION

Mass Systemswitch

Automatic AC transfer switch

CE

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CONTENTS:

v 2.1 May 2007

1 GENERAL INFORMATION 4
1.1 Use of this manual 4
1.2 Guarantee Specifications 4
1.3 Quality 4
1.4 Validity of this manual 4
1.5 Liability 4

2 SAFETY GUIDELINES AND MEASURES 5
2.1 Warnings and symbols 5
2.2 Use for intended purpose 5
2.3 Organisational measures 5
2.4 Warning of special dangers 5

3 HOW IT WORKS 6
3.1 Source priority 6
3.2 AC inputs 6
3.2.1 Only inverter power available 6
3.2.2 Shore power available 6
3.2.3 Generator power available 7
3.3 AC outputs 7
3.3.1 Inverter only output (no break) 7
3.3.2 Short break output 7
3.3.3 Power output 7
3.3.4 Generator only output 7
3.4 Monitoring and control 8
3.4.1 Remote control panel (optional) 8
3.4.2 MasterBus (optional) 8
3.5 Load on inverter mode 9
3.6 Automatic load on inverter mode 9
3.6.1 Use of a traditional remote control panel 9
3.6.2 MasterBus 9
3.6.3 Example 10

4 INSTALLATION 11
4.1 General 11
4.2 Environment 11
4.3 Tools required for installation 11
4.4 Mounting of the cabinet 11
4.5 Opening the connection compartment 12
4.6 Wire cross section 12
4.7 Ground connections 13
4.8 Wiring 13
4.9 Inputs 14
4.10 Outputs 14
4.11 Remote panel (optional) 14
4.12 MasterBus (optional) 14
4.13 Commissioning after installation 15
4.13.1 MasterBus (optional) 15
4.14 Decommissioning 15
4.15 Storage and transportation 15
4.16 Re-installation 15

5 MASTERBUS 16
5.1 What is MasterBus? 16
5.2 Event based commands 16
5.3 How to set up a MasterBus network 17

6 SPECIFICATIONS 18
6.1 Technical data 18
6.2 Outline drawing 19
6.3 MasterBus: Monitoring and Programming of the Mass Systemswitch 20
6.3.1 Menu level 2: Monitoring 20
6.3.2 Menu level 3: History 20
6.3.3 Menu level 3: Configuration 21
6.3.4 List of event sources 22
6.3.5 List of event commands 22
6.3.6 Personal settings and notes 23

7 ORDERING INFORMATION 24
7.1 Traditional remote control panels 24
7.2 MasterBus remote control panels 24
7.3 MasterBus installation components 25
7.4 Miscellaneous 25

8 EC DECLARATION OF CONFIRMITY 26

1 GENERAL INFORMATION

The MASTERVOLT *Mass Systemswitch* is the heart of the AC installation. It is designed to take over manual switching between three different power sources. The *Mass Systemswitch* automatically transfers the available AC power source to the right outputs. Automatic switching between the power sources doesn't only offer you more comfort; it also improves the safety on board. The switching between the power sources, which is done by means of relays, assures that no short-circuiting will occur. All models have three inputs: *Generator*, *Shore*, and *Inverter*. The *Mass Systemswitch* 10 and 16 models both have four outputs: *Generator only*, *Power*, *Shortbreak* and *Inverter only*. The *Mass Systemswitch* 6 has three outputs: *Power*, *Shortbreak* and *Inverter only*.

The actual status of the *Mass Systemswitch* can be monitored by means of one of the following Mastervolt remote control panels

- *AC System Manager*
- *AC System Manager + Whisper*
- *Power System Control panel 3 AC/DC*
- *Power System Control panel 4 AC/DC*

Instead of using one of the above mentioned remote control panels, the *Mass Systemswitch* is also compatible to be used in the MasterBus network: a decentralized data network, giving you full control over the entire electrical installation

1.1 USE OF THIS MANUAL

This manual serves as a guideline for the safe and effective operation, installation, maintenance and possible correction of minor malfunctions of the *Mass Systemswitch*.
This manual is valid for the following models:

Description	Part number
Mass Systemswitch 6	55008005
Mass Systemswitch 10	55008105
Mass Systemswitch 16	55008205

It is therefore obligatory that every person who works with the *Mass Systemswitch* must be completely familiar with the contents of this manual, and that he / she carefully follows the instructions contained herein. The manual must be immediately accessible to the user. This manual has 8 chapters.

1.2 GUARANTEE SPECIFICATIONS

Mastervolt guarantees that this unit has been built in accordance with the legally applicable standards and specifications. Should work take place, which is not in accordance with the guidelines, instructions and specifications contained in the user manual, damage may occur and / or the unit may not fulfil its specifications. All these matters may mean that the guarantee may become invalid.

1.3 QUALITY

During the production and prior to their delivery, all our units are exhaustively tested and inspected. The guarantee period is two years.

1.4 VALIDITY OF THIS MANUAL

All the specifications, provisions and instructions contained in this manual apply solely to the MASTERVOLT-delivered standard versions of the *Mass Systemswitch*.

1.5 LIABILITY

MASTERVOLT can accept no liability for:

- Consequential damage due to use of the *Mass Systemswitch*.
- Possible errors in the manuals and the results thereof.

CAREFUL!
Never remove the type number plate.

Important technical information required for service, maintenance & secondary delivery of parts can be derived from the type number plate.

2 SAFETY GUIDELINES AND MEASURES

2.1 WARNINGS AND SYMBOLS

Safety instructions and warnings are marked in this manual by the following pictograms:

A procedure, circumstance, etc which deserves extra attention.

CAREFUL!
Special data, restrictions and rules with regard to preventing damage.

WARNING
A WARNING refers to possible injury to the user or significant material damage to the *Mass Systemswitch* if the user does not (carefully) follow the procedures.

2.2 USE FOR INTENDED PURPOSE

1. The *Mass Systemswitch* is constructed as per the applicable low voltage directive.

2. Use the *Mass Systemswitch* only:

- in a technically correct condition;
- in a closed room, protected against rain, moisture, dust and non condensing circumstances;
- observing the instructions and specifications in the manual.
- as a stand alone unit or in combination with one of the following Mastervolt remote control systems:
  - *AC System Manager*
  - *AC System Manager + Whisper*
  - *Power System Control panel 3 AC/DC*
  - *Power System Control panel 4 AC/DC*
  - *MasterBus network*

WARNING
Never use the *Mass Systemswitch* at locations where there is danger of gas or dust explosion!.

3. Use other than as mentioned under 2 is not considered to be consistent with the intended purpose. MASTERVOLT is not liable for any damage resulting from the above.

2.3 ORGANISATIONAL MEASURES

The user must always:

- have access to the user manual

- be familiar with the contents of this manual. This applies particularly to Chapter 2, Safety Guidelines & Measures.

2.4 WARNING OF SPECIAL DANGERS

1. Check the wiring at least once a year. Defects such as loose connections, burnt wiring etc. must be corrected immediately.

2. Do not work on the *Mass Systemswitch* or the electrical system if it is still connected to a power source. Only allow changes in your electrical system to be carried out by qualified electricians.

3. Installation must be done in accordance with local standards.

4. Voltages above 34 V can be dangerous. Use caution and pay careful attention when installing the *Mass Systemswitch*. Avoid short circuiting.

3 HOW IT WORKS

3.1 SOURCE PRIORITY

The *Mass Systemswitch* switches the right AC power source to the output(s). Therefore the *Mass Systemswitch* is equipped with a source priority. If more than one AC power source is available, the source with the highest priority is switched to the output(s).

See figure 1. The *generator input* has the highest priority: when generator power is available, all outputs (except the *inverter only* output) are supplied by the generator. Power on the *shore input* and/or the *inverter input* will be denied even when they are available.

The *shore input* has the second priority. If there is no generator power available, shore power will be transferred to the *power output* and the *short break output*. Power on the *inverter input* will be denied.

The lowest priority is assigned to the inverter. AC power on the *inverter input* is transferred to the *short break output* only when no other power source is available.

3.2 AC INPUTS

Three AC-sources can be connected to the *Mass Systemswitch*:

- *Inverter power* (IN3),
- *Shore power* (IN2)
- *Generator power* (IN1)

3.2.1 Only inverter power available

When there is no AC power available on the *generator input* or the *shore input,* power from the *inverter input* is transferred to the *short break output* only. The *power output* and the *generator only output* are unavailable now. The *Mass Systemswitch* is in a neutral state and consumes no energy it self.

3.2.2 Shore power available

When there is no generator power available but AC power is available on the *shore input*, the *Mass Systemswitch* will supply both the *power output* and the *Short break output* with AC power from the *shore input.* The *generator only output* is unavailable now.

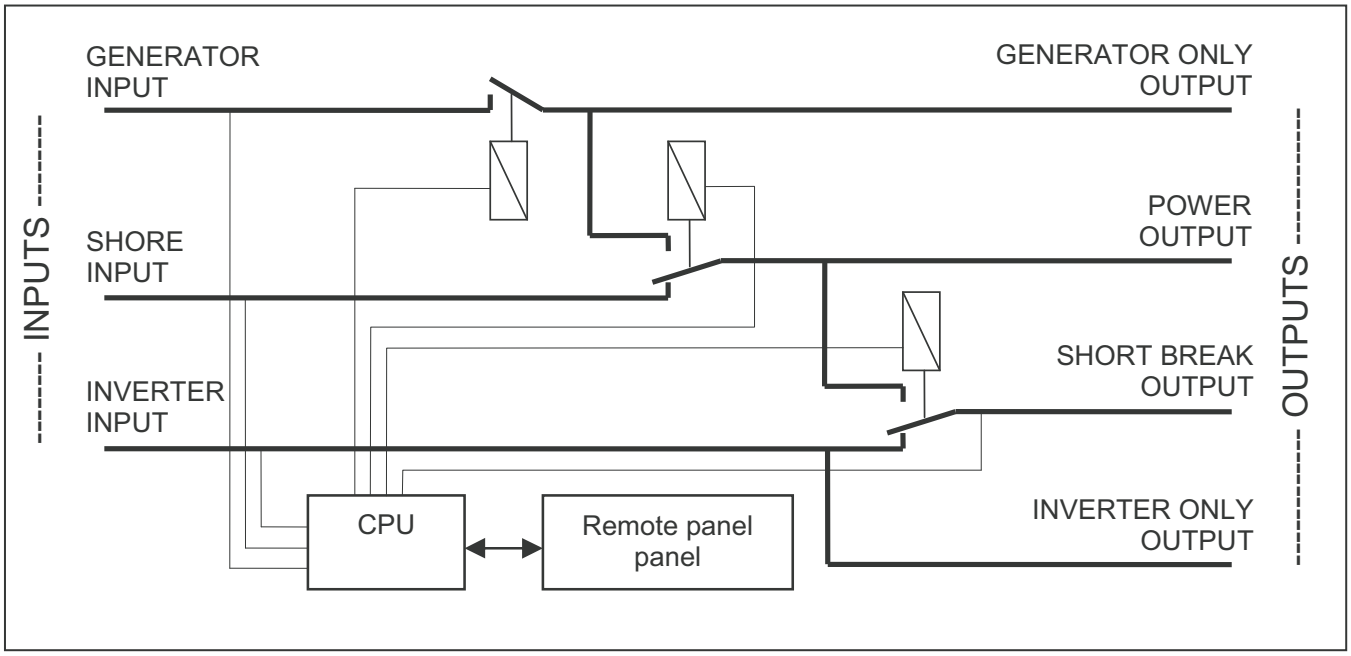


Figure 1: principle schematics of the Mass Systemswitch

3.2.3 Generator power available

When the generator is started, a control circuit samples its output voltage and frequency. Only when both are within allowed limits for approximately 10 seconds, the *Mass Systemswitch* transfers the power from the *generator input* to all outputs (except the *inverter only output*).

Too low generator frequency and voltage may cause damage to both the generator and the connected load. Therefore AC power on the *generator input* is continuously checked by a control circuit. If the generator frequency or voltage is too low, generator power is immediately cut of from the load.
The 10 seconds time delay provides an 'easy start up' for the generator. This increases the generator's lifetime.

3.3 AC OUTPUTS

The *Mass Systemswitch* has the following AC-outputs:

- *Inverter only output*
- *Short break output*
- *Power output*
- *Generator only output**

*not available on the *Mass Systemswitch 6*

3.3.1 Inverter only output (no break)

The *Inverter only output* is directly powered by the inverter. This means that this output will never be transferred to one of the other AC sources. Critical loads like a computer or navigations equipment which are sensitive for voltage drops should be connected to this output.

3.3.2 Short break output

The *Short break output* is transferred between the *generator input*, *shore input* and *inverter input*, depending on the availability. In principle, AC-power is always available on this output during the transfer, users are not supplied with power for a short time.

CAREFUL!
During transfer between the AC inputs, users are not supplied with power for a short time. Because of this, computers etc. connected to this output might loose data

Due to the source priority this output is supplied by shore power if available. And also, if generator power is available, this output will be supplied by the *generator input*. This means that the *generator input* has a higher priority than *shore input* and the *shore input* has a higher priority than *inverter input*. This preferent behaviour is not always wanted. For instance if the external shore power breaker is only 4 Amps, it is not possible to power the whole electrical system at the same time. It is however possible to override this preference manually by means of the *load on inverter mode*. See section 3.5 for additional information.

3.3.3 Power output

Depending on its availability, the *power output* is powered by the *generator input* or the *shore input*. The generator is the highest in priority and therefore overrules the shore power. Medium power loads like the battery charger must be connected to this output.

3.3.4 Generator only output

Finally the *generator only output* is powered by the generator only. Larger loads like a water maker or an electric cooking appliance should be connected to this output.

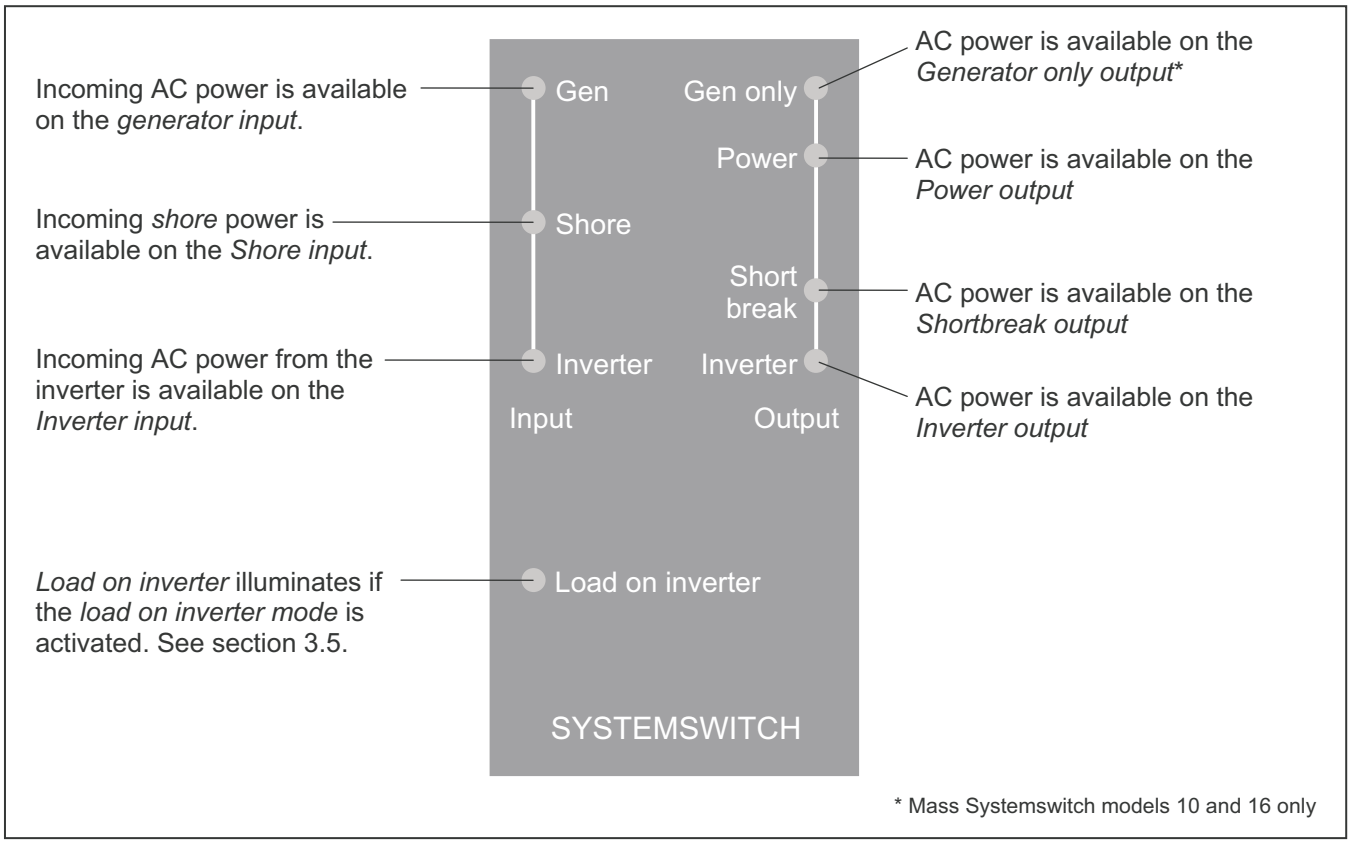

Incoming AC power is available on the *generator input*.
Incoming *shore* power is available on the *Shore input*.
Incoming AC power from the inverter is available on the *Inverter input*.
Load on inverter illuminates if the *load on inverter mode* is activated. See section 3.5.
Gen
Shore
Inverter
Input
Load on inverter
SYSTEMSWITCH
Gen only
Power
Short break
Inverter
Output
AC power is available on the *Generator only output**
AC power is available on the *Power output*
AC power is available on the *Shortbreak output*
AC power is available on the *Inverter output*
* Mass Systemswitch models 10 and 16 only

Figure 2: Indicator lights on front of the Mass Systemswitch

3.4 MONITORING AND CONTROL

The indicator lights on the front of the cabinet give an indication about the status your AC installation. The meaning of the lights is explained in figure 2

3.4.1 Remote control panel (optional)

For remote operation Mastervolt offers a wide range of intelligent remote control panels that can be connected to the *Mass Systemswitch*, giving you an exact status overview of the available AC-power sources. Besides when a remote control panel is applied, a very useful feature of the *Mass Systemswitch* can be used: the *load on inverter mode.* See section 7 for an overview of the available panels.

3.4.2 MasterBus (optional)

The *Mass Systemswitch* is compatible with the *MasterBus* network: a fully decentralized data network for communication between the different Mastervolt system devices such as the inverter, battery charger, generator, batteries and many more. See section 5 for details

3.5 LOAD ON INVERTER MODE

As described above, the *Short break output* is transferred between the *generator input*, *shore input* and *inverter input*, depending on its availability. However, to prevent the generator from an overload situation or to prevent the shore fuse from tripping, the load that is connected to the *Short break* output can be switched either manually or automatically from the generator or shore power to the output of the inverter. We call this the *"load on inverter mode"* or the *"force to inverter mode".*

See figure 3. When the *load on inverter mode* is switched OFF, the *Mass Systemswitch* is in normal state. This means that the *Short break output* is transferred between the *generator input*, *shore input* and *inverter input*, depending on the availability.

However, when the *load on inverter mode* is switched ON (figure 4), power from the generator or the shore can no longer be used to supply the *Short break* output. The *Short break* output will only be supplied by the inverter.
See the section *user menu* of the manual of the remote operation panel to toggle the *load on inverter mode* manually.

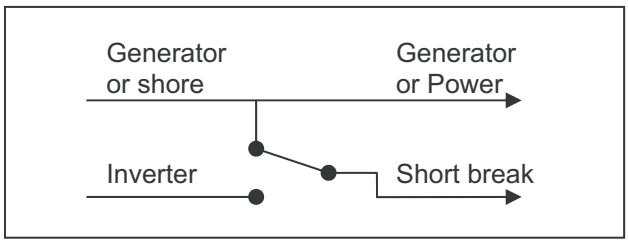


Figure 3: Load on inverter mode is OFF, while power from the generator or the shore is available

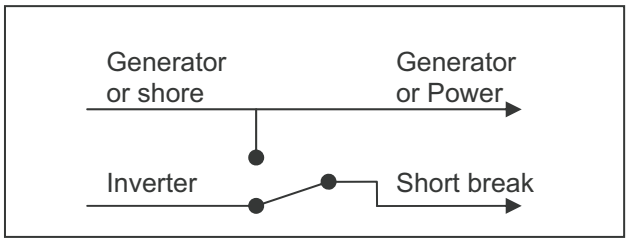


Figure 4: Load on inverter mode is ON, while power from the generator or the shore is available

3.6 AUTOMATIC LOAD ON INVERTER MODE

It is also possible to toggle the *load on inverter mode* automatically. Then the *load on inverter mode* will be switched ON when the current on the *shore input* or the *generator input* exceeds a predefined set point. Then we call it the *"**automatic** load on inverter mode"* or the *"**automatic** force to inverter mode".*

3.6.1 Use of a traditional remote control panel

If a traditional remote control panel is applied (see section 7.1), the *"automatic load on inverter mode"* can be triggered by:

- The generator current (delayed)
- The shore current (not delayed)

To adjust the settings of the *automatic load on inverter mode* refer to *ADVANCED A-menu* of the manual of the remote operation panel

3.6.2 MasterBus

If the Mass Systemswitch is controlled by MasterBus, (see section 7.2) operation of the *"automatic load on inverter mode"* can be programmed by means of an *event-based command*. See section 6.3 for details. Refer to the manual of the MasterBus remote panel for details about programming of *event-based commands*.

3.6.3 Example

See figure 5

A coffee machine is switched on, causing an extra load on the shore/generator. When the total load that is connected to the shore or the generator exceeds its maximum current level first a time delay is triggered. After this delay time the *automatic load on inverter mode* will be activated: a part of the total load is switched from the generator/ shore to the AC output of the inverter. When the *automatic load on inverter mode* is activated, it is switched off again when the adjusted time has elapsed.

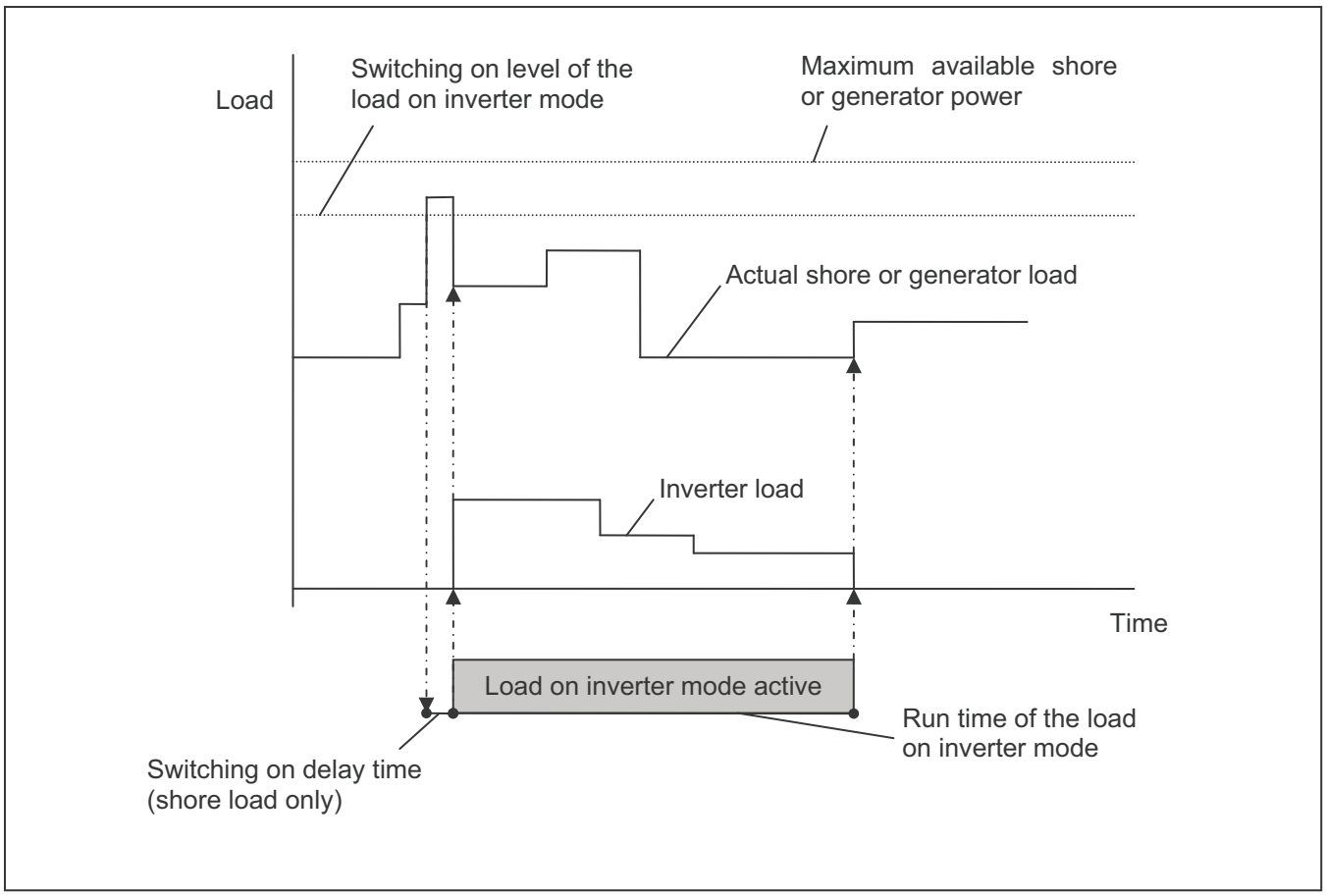

Load
Switching on level of the load on inverter mode
Maximum available shore or generator power
Actual shore or generator load
Inverter load
Time
Load on inverter mode active
Run time of the load on inverter mode
Switching on delay time (shore load only)

Figure 5: Settings of the "Automatic load on inverter"- mode

4 INSTALLATION

WARNING
Be sure that all AC power sources are switched off or disconnected during installation.

WARNING
External fuses and earth leakage switches must be integrated in the wiring of all inputs and outputs of the *Mass Systemswitch.*

4.1 GENERAL

During installation and commissioning of the *Mass Systemswitch* the Safety Guidelines and Measurements are applicable at all times. See section 2 of this manual.

After unpacking, check the *Mass Systemswitch* for possible damage. Do not use the *Mass Systemswitch* if the cabinet is damaged.

4.2 ENVIRONMENT

Obey the following stipulations during installation:
- The *Mass Systemswitch* is designed for indoor use only.
- Humidity: 0-95% non condensing
- Mount the *Mass Systemswitch* on a solid surface, with the connecting cables downwards.

4.3 TOOLS REQUIRED FOR INSTALLATION

We recommend as a minimum tool kit:
- Flat blade screw driver 1.0 x 4.0 mm to fix the screw terminals of the AC wiring.
- Flat blade screw driver 0.6 x 3.5 mm for connection of the remote panel
- Tools to fix the screws / bolts (Ø 6mm) with plugs to mount the cabinets to a surface
- Phillips screw driver nr. 2 to open the connection area of the *Mass Systemswitch.*

4.4 MOUNTING OF THE CABINET

Take the following steps to mount the cabinet:
1. Determine for the four mounting spots on the basis of the outline drawings (section 6.2)
2. Fix the screws (Ø 6mm) into the surface but do not tighten them entirely.
3. Place the housing over the screws
4. Fix the housing by fastening the screws securely.

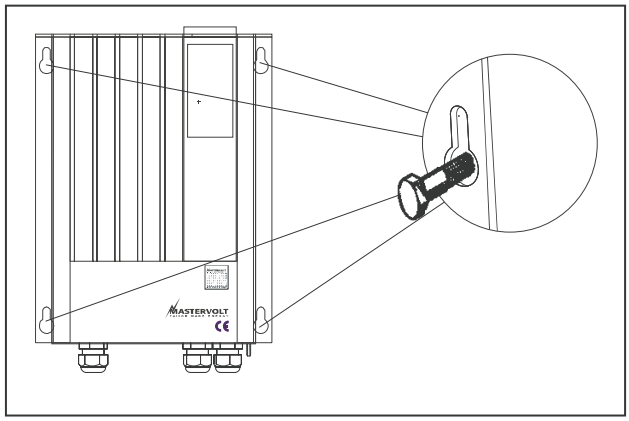


Figure 6: mounting of the cabinet

4.5 OPENING THE CONNECTION COMPARTMENT

See figure 7. Steps:

1. Loosen the two Phillips screws A and B that secure the front cover plate for two turns
2. Slide the front cover plate from the cabinet (C) (downwards).
3. The terminals and cable glands are now accessible.

Note: If necessary you can also remove the gland plate by loosening screws D, E and F. Read section 4.13 carefully to close the connection compartment again.

Always close the connection compartment prior to commissioning of the *Mass Systemswitch*

4.6 WIRE CROSS SECTION

For a safe installation the correct wire cross section must be applied. Don't use a cross section that is smaller than indicated. See table below to select the appropriate cross section for the AC wiring:

AC-Current	Minimum cross section:	
	in mm²	AWG
0-16 Amp	2.5 mm²	AWG 13
16-32 Amp	4 mm²	AWG 11
32-48 Amp	6 mm²	AWG 9
48-80 Amp	10 mm²	AWG 7

WARNING
Use cable with the right wire cross section!.

Under-sized wires and/or loose connections can cause dangerous overheating of the wires and/or terminals. Therefore use the proper size and tighten all connections well, in order to limit transition resistance as far as possible.

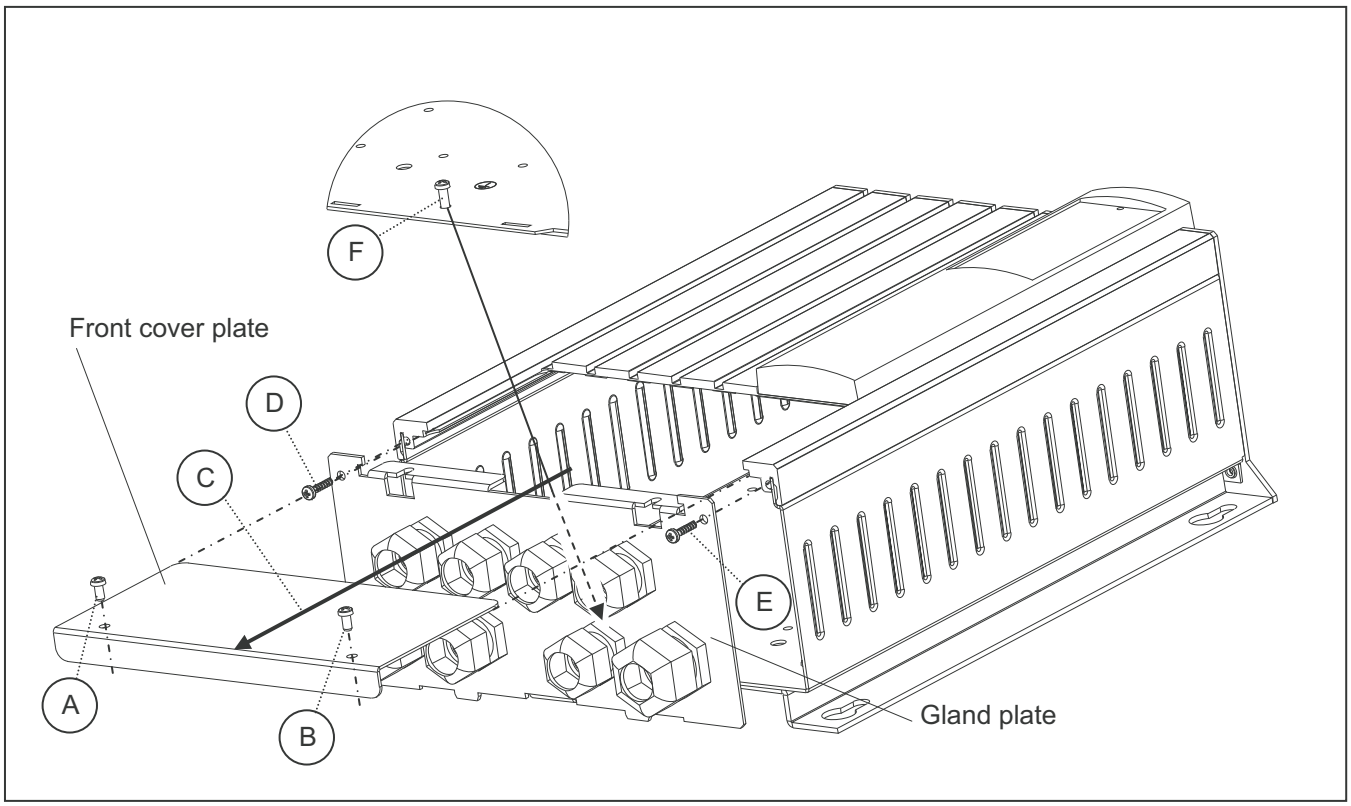


Figure 7: opening of the connection compartment

4.7 GROUND CONNECTIONS

The ground wire offers protection only if the cabinet of the *Mass Systemswitch* is connected to the system ground. Connect the inverter's earth terminal (PE) to the hull or the chassis.

For safety reasons it is very important that all ground connections of the power sources and power consumers are connected to the central ground connection of the ship. Improper ground connections might lead to life treating situations. A reliable ground connection is made by connecting the sources and the consumers to the ground terminal (ref. 10) of the *Mass Systemswitch*. This ground terminal must be connected to the central ground connection of the ship, which is connected to the hull of the ship.

When the ship lies in sea water (salt) while using shore power, corrosion can occur. This corrosion is caused by potential differences between shore ground and ships ground. Using an isolation transformer will solve this problem. Mastervolt can provide a suitable transformer.

4.8 WIRING

The wiring is connected inside the connection compartment. If necessary, the cabling can be fed from the top to the bottom side of the cabinet along the back of the cabinet. Always feed the wiring through the cable glands of the cabinet, and then connect the wiring to the terminals.
Fix the phase line wire to the L terminal, the neutral wires to the N terminal. Fix the ground wires (PE) to the ground terminal bus bar (ref. 10).

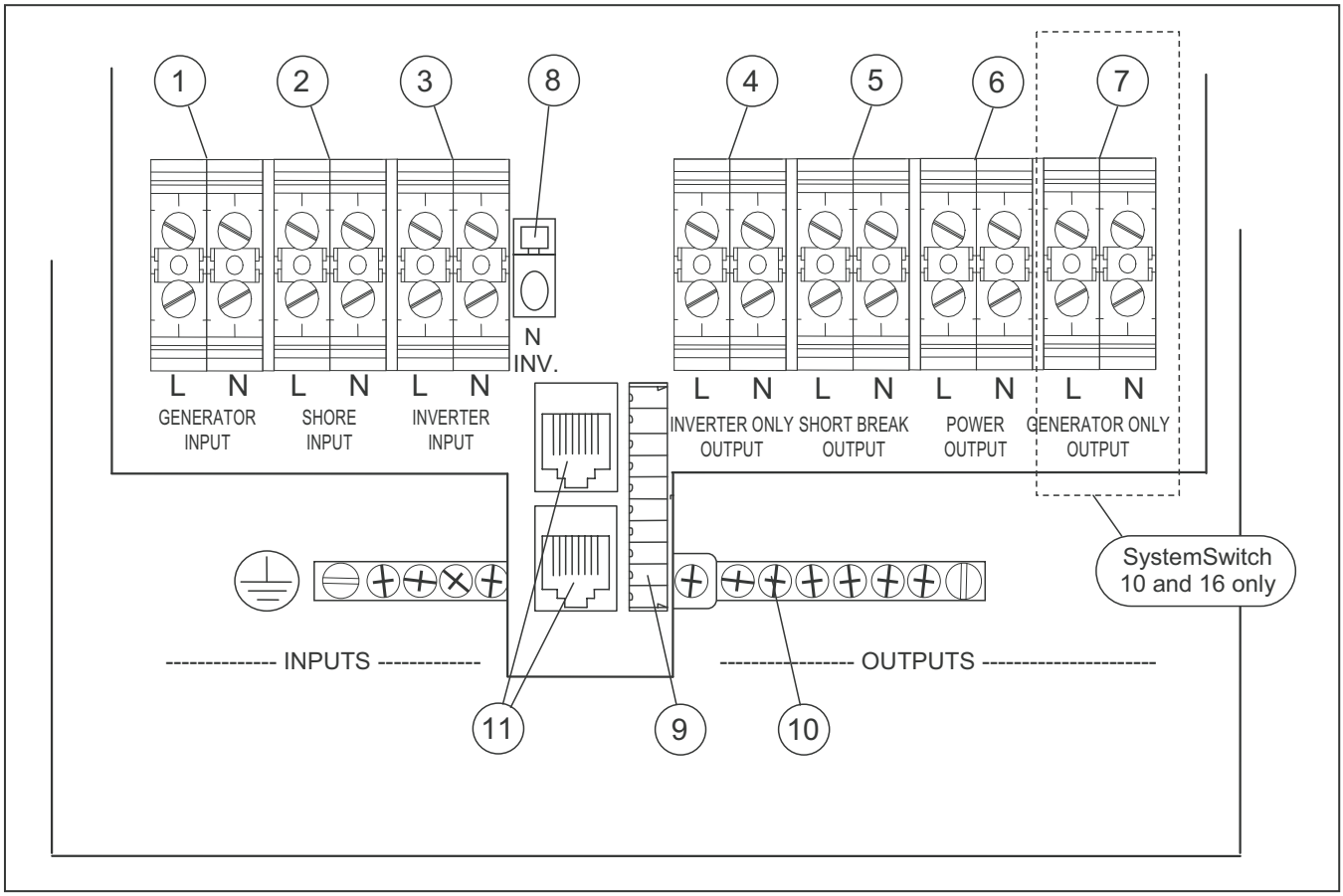


Figure 8

4.9 INPUTS

See figure 8 and the table below to connect the AC power sources. Refer to section 3.2 for additional information about the AC inputs

Terminals	AC source
①	Generator
②	Shore power connection
③	Inverter

Figure 9:
Connections to the AC sources

This *Mass Systemswitch* is provided with a ground bonding terminal (ref 8) which is indicated by “N-INV”. It allows you to connect the Safety Ground (PE) of the inverter to the neutral conductor (N) of electrical installation. Refer to local regulations on this issue.

4.10 OUTPUTS

The output terminals are situated on the right hand side. Connect the load to the terminals as indicated in figure 8 and figure 10.

Terminals	AC output
④	Inverter only
⑤	Short break
⑥	Power
⑦	Generator only*

* Mass Systemswitch models 10 and 16 only.

Figure 10:
Connections to the AC output groups

Refer to section 3.3 for additional information about the use of the above mentioned AC output groups.

4.11 REMOTE PANEL (OPTIONAL)

See figure 8. If a Mastervolt remote control panel is applied, you can fix the wires of the 10x0.5 mm² cable from the remote panel to the remote control connector (ref 9 in figure 11) See also section *INSTALLATION* of the manual of the remote control panel.
These signals are galvanically isolated from the mains grid.

Note: for an easy installation you can pull the screw connector from the holder on the printed circuit board

Pin	Function
1	- load on inverter
2	+ load on inverter
3	GND
4	U Generator
5	U shore
6	U inverter
7	System voltage
8	+ 12V power
9	GND
10	AC current

Figure 11:
Pin configuration of the 10-pole connector to the remote control panel

4.12 MASTERBUS (OPTIONAL)

See figure 8. The *Mass Systemswitch* can be connected to the *MasterBus* network by means of the two data ports (figure 8, reference 11). See also section 5.3 for details.

For remote operation of the *Mass Systemswitch* you have to choose between either the *MasterBus* network or a remote panel as described in section 4.11. You can not use both simultaneously

4.13 COMMISSIONING AFTER INSTALLATION

Follow the steps described below to switch on the *Mass Systemswitch*.

1. Tighten all cable glands to ensure the pull relief
2. Check all wiring and connections.
3. Close the front cover plate of the connection compartment.

Note: If the gland plate was removed during installation, be sure to slide back the cover plate before you fix screws D and E (see figure 7).

4. Switch on the AC power sources.

Now the *Mass Systemswitch* is ready for operation.

4.13.1 MasterBus (optional)

During first commissioning the *Mass Systemswitch* will be recognized by the MasterBus network automatically. The remote control panel of the MasterBus network will indicate that a new device was found.

The factory settings of the Mass Systemswitch are optimal for most installations. In some applications however, it is desirable to change settings. See section 6.3 for an overview of all available settings. Refer to the user's manual of the remote control panel to change these settings.

Some settings can only be changed via the MasterBus interface. If changes were made to the factory settings, all LEDS will flash for three times during powering of the *Mass Systemswitch*, i.e. when either *generator* or *shore* input comes available or when the MasteBbus is powered.

4.14 DECOMMISSIONING

If it is necessary to put the *Mass Systemswitch* out of operation, follow the instructions in order of succession as described below:

1. Switch off all loads
2. Switch off the AC power sources. These power sources should be secured against unexpected and unintended switching on.
3. Open the connection compartment of the *Mass Systemswitch* (see paragraph 4.5)
4. Check with a suitable voltage meter whether the inputs and the outputs of the *Mass Systemswitch* are voltage free.
5. Disconnect all wiring

Now the Mass Systemswitch can be demounted in a safe way.

4.15 STORAGE AND TRANSPORTATION

When not installed, store the *Mass Systemswitch* in the original packing, in a dry and dust free environment.

Always use the original packing for transportation. Contact your local Mastervolt Service Centre for further details if you want to return the apparatus for repair.

4.16 RE-INSTALLATION

To reinstall the *Mass Systemswitch*, follow the instructions as described in section 4.

5 MASTERBUS

5.1 WHAT IS MASTERBUS?

All devices that are suitable for MasterBus are marked by the MasterBus symbol.

MasterBus is a fully decentralized data network for communication between the different Mastervolt system devices. It is a CAN-bus based communication network which has proven itself as a reliable bus-system in automotive applications. MasterBus is used as power management system for all connected devices, such as the inverter, battery charger, generator and many more. This gives the possibility for communication between the connected devices, for instance to start the generator when the batteries are low.

MasterBus reduces complexity of electrical systems by using UTP patch cables. All system components are simply chained together. Therefore each device is equipped with two MasterBus data ports. When two or more devices are connected to each other through these data ports, they form a local data network, called the MasterBus. The results are a reduction of material costs as only a few electrical cables are needed and less installation time.

For central monitoring and control of the connected devices Mastervolt offers a wide range of panels which show full status information of your electrical system at a glance and a push of a button. Four different panels are available, from the small Mastervision compatible 120 x 65mm LCD screen up to the full colour MasterView System panel. All monitoring panels can be used for monitoring, control and configuration of all connected MasterBus equipment.

New devices can be added to the existing network in a very easy way by just extending the network. This gives the MasterBus network a high degree of flexibility for extended system configuration, not only today, but in the future as well!
Mastervolt also offers several interfaces, making even non-MasterBus devices suitable to operate in the MasterBus network

5.2 EVENT BASED COMMANDS

With MasterBus each device can be programmed to initiate an action at an other connected device. This is done by means of *event based commands*.

Example: if the shore power is almost in overload, the generator must be started.
As the shore power is measured by the *Mass Systemswitch,* this device is considered as the *command source*. The generator is the device that should initiate an action (start the generator), and is therefore considered to be the *target*. This means that the *Mass Systemswitch* must be programmed as follows:

Event source:	Shore pre overload	Select from *list of events sources* (see manual of the *Mass Systemswitch*)
Event target:	Generator	Select from the *device list* (devices connected to the MasterBus)
Event command:	Status	Select *event command* from the *list of event commands* of the target (see manual of the of the *Generator)*
Event data:	On	Select *event data* from the *list of event commands* of the target (see manual of the of the *Generator)*

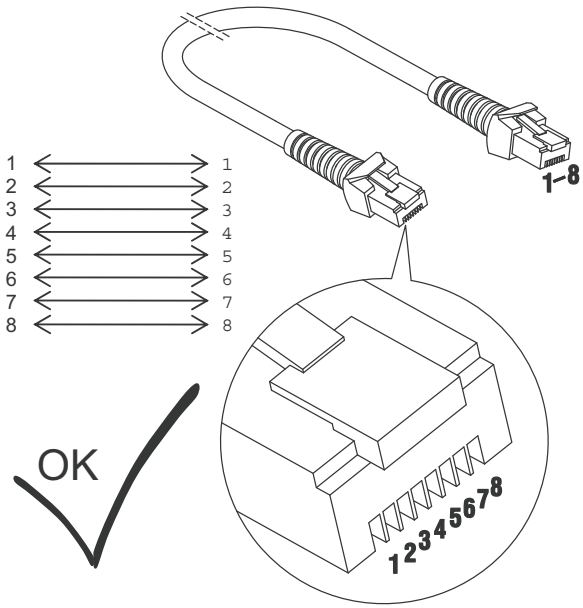
See section 6.3.4 for the *list of events sources* and section 6.3.5 for the *list of event commands* of the *Mass SystemSwitch*

5.3 HOW TO SET UP A MASTERBUS NETWORK

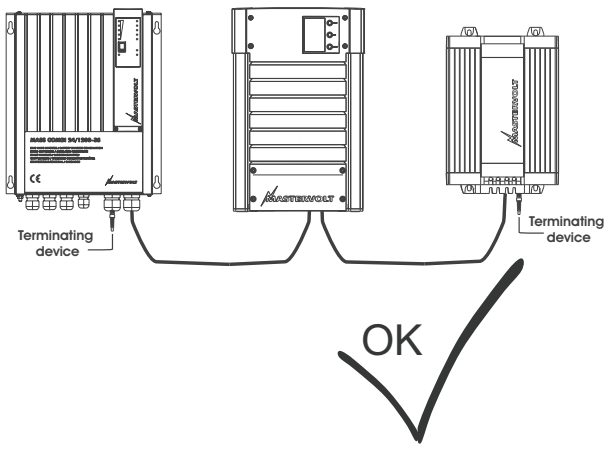
Each device that is suitable for the MasterBus network is equipped with two data ports. When two or more devices are connected to each other through these ports, they form a local data network, called the MasterBus.

Keep the following rules in mind:

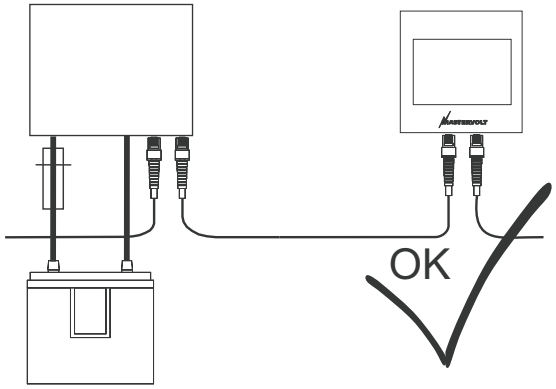
Connections between the devices are made by standard straight UTP patch cables. Mastervolt can supply these cables. These cables are also commonly available at computer supply stores.



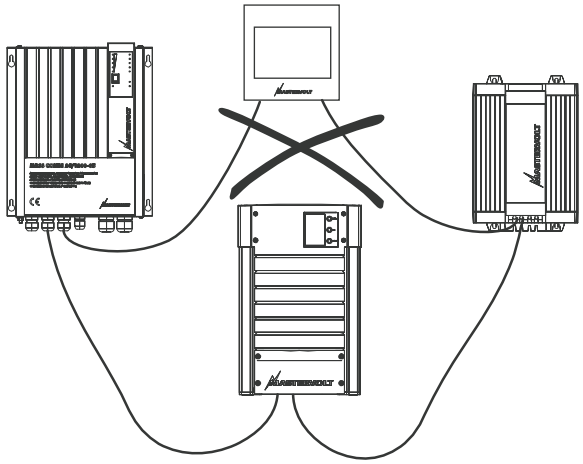
As with all high speed data networks, MasterBus needs a terminating device on both ends of the network



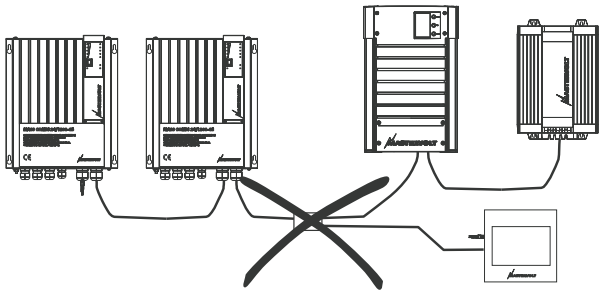
The electric power for the network comes from the connected devices.
At least one device in the network should have powering capabilities (see specifications).
One powering device can power up to three non-powering devices.
As all powering devices are galvanically isolated, multiple powering devices are allowed



Do not make ring networks



Do not make T-connections in the network



6 SPECIFICATIONS

6.1 TECHNICAL DATA

Model:	Mass Systemswitch 6	Mass Systemswitch 10	Mass Systemswitch 16
Part number:	55008005	55008105	55008205
Function of the product:	Automatic transfer switch system between single phase 230V power sources and output groups. Additional external circuit breakers must be applied (installation dependent).		
Manufacturer:	Mastervolt, Amsterdam, the Netherlands		
System voltage:	Single phase 200 – 250 VAC / 50-60Hz		

Nominal input current	Mass Systemswitch 6	Mass Systemswitch 10	Mass Systemswitch 16
- Generator input:	25A	40A	63A
- Shore input:	25A	25A	40A
- Inverter input:	25A	25A	25A
Earth leakage breaker (RCCB):	N/A, must be applied externally (installation dependent)		

Nominal output current	Mass Systemswitch 6	Mass Systemswitch 10	Mass Systemswitch 16
- Inverter only output:	25A	25A	25A
- Short break output:	25A	25A	25A
- Power output:	25A	25A	40A
- Generator only output:	n/a	40A	63A
Automatic circuit breakers:	N/A, must be applied externally (installation dependent)		

General	Mass Systemswitch 6	Mass Systemswitch 10	Mass Systemswitch 16
Power consumption: (AC available on all inputs)	27VA ± 10%	33VA ± 10%	33VA ± 10%
Power consumption: (only inverter power available)	< 1VA	< 1VA	< 1VA
Connection for optional Mastervolt remote panel:	Yes, see section 7 for an overview of available models		
Compatible with MasterBus	Yes, see section 6.3 for settings		
LED indications:	--- *AC source present* for each input, *AC output present* for each output and *Load on inverter* ----		
Switching time:	On: 12…22ms / Off: 4…19ms		
Standard settings threshold values	*Generator input* pass through (adjustable via MasterBus, see section 6.3)		
- Voltage:	On: > 205V ± 5% / Off: < 150V		
- Frequency:	On: > 48Hz ± 5% / Off: < 43 Hz		
- Delay time:	Approximately 10 sec.		

ENVIRONMENT	
Specified operation temperature	-5…+60 °C (will meet specified tolerances)
Allowed operating temperature:	-40…+70 °C (may not meet all specified tolerances)
None operating temperature:	-60…+80 °C (storage temperature)
Relative humidity:	95% max., non-condensing

ENCLOSURE			
Dimensions, H x W x D:	340x261x144 mm / 13.4x10.3x5.7 inch. See also section 6.2.		
Approximate weight:	4.4 kg / 9.6 Lbs ± 5%	4.9 kg / 10.8 Lbs ± 5%	5.0 kg / 11.1 Lbs ± 5%
Protection degree:	IP23	IP23	IP23

TERMINALS	Wire size:	Recommended torque:
AC inputs and outputs:	0.5 - 10mm² / AWG 20 - 7	1.2 – 1.5 Nm / 11 – 13 InLbs
	Recommended strip length: 12mm / 0.5 inch	
Remote control panel:	0.14 – 2.5mm² / AWG 26 - 13	0.5 – 0.6 Nm / 4.4 – 5.3 InLbs
All specifications are subject to change without prior notice.		

6.2 OUTLINE DRAWING

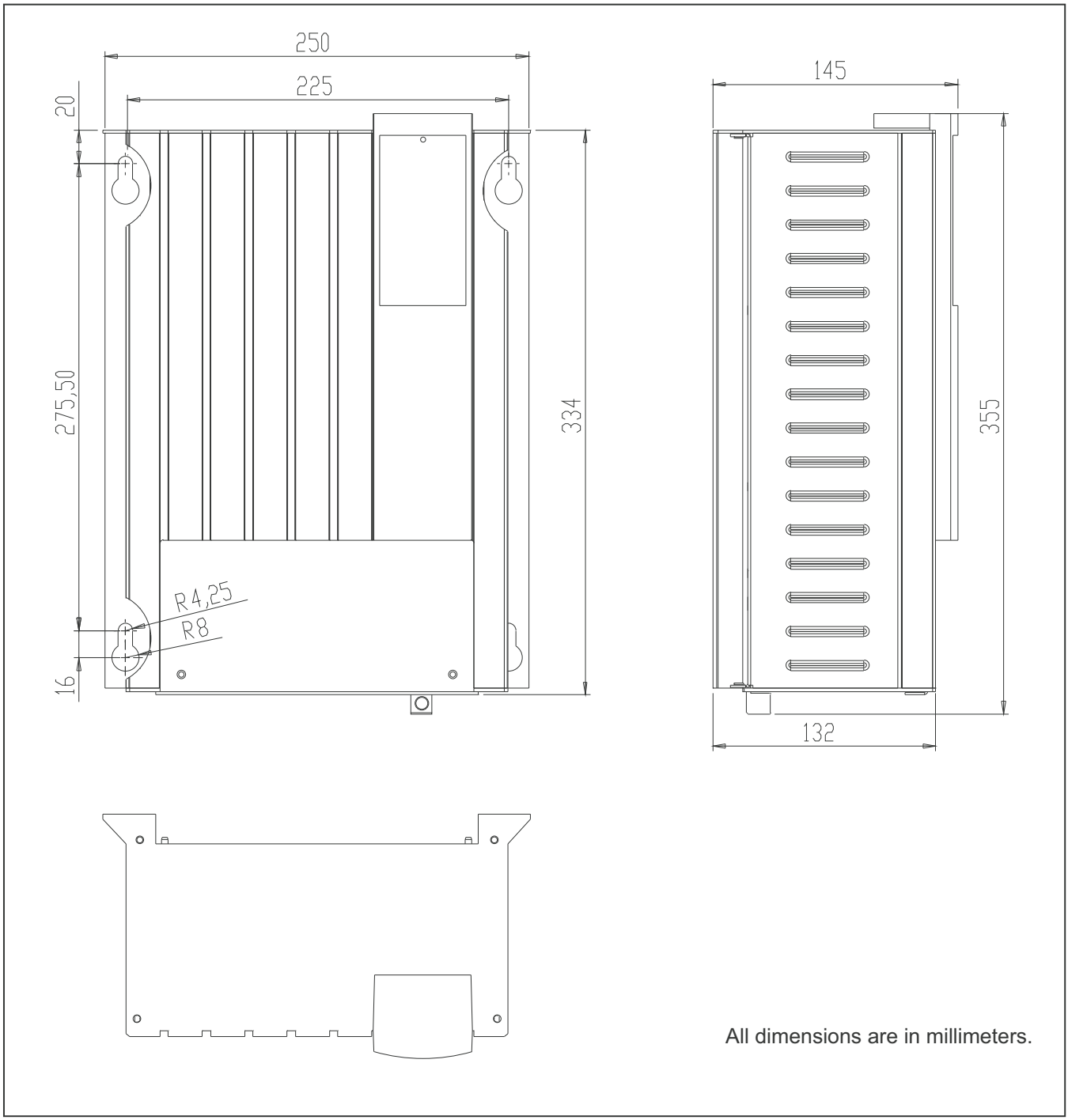


Figure 12: dimensions of the Mass Systemswitch

6.3 MASTERBUS: MONITORING AND PROGRAMMING OF THE MASS SYSTEMSWITCH

6.3.1 Menu level 2: Monitoring

Value	Meaning	Default	Adjustable range
Load on inverter	See section 3.6	Auto	Auto/On/Off
Short break src	Shows name of the input that supplies electric power to the *short break* output of the *Mass Systemswitch* at this moment.	Generator/ Shore/ Inverter	(read only)
Power source	Shows name of the input that supplies electric power to the *power* output of the *Mass Systemswitch* at this moment.	Generator/ Shore	(read only)
Gen. voltage	Actual voltage of the generator (V)		(read only)
Gen. Frequency	Actual frequency of the generator (Hz)		(read only)
Generator load	Actual power of the generator (kVA)		(read only)
Shore voltage	Actual voltage of the shore power (V)		(read only)
Shore fuse	Setting of the shore fuse. This setting is used as threshold for the *"automatic load on inverter mode"* function	40A (25A*)	0-40A (0-25A*)
Pwr src current	Actual input current (Amps) of the AC-source that feeds the *Power output* of the *Mass Systemswitch.* The actual AC-source is either the *generator* or *shore,* depending on its availability (see "Power source" above).		(read only)
Pwr src limit	Maximum allowed input current (Amps) of the AC-source that feeds the *Power output* of the *Mass Systemswitch.* The actual AC-source is either the *generator* or *shore,* depending on its availability (see "Power source" above).	*Shore*: see *Shore fuse*; section 6.3.1. *Generator*: see *Generator Power*; section 6.3.3	(read only)

* Mass Systemswitch 6 only

6.3.2 Menu level 3: History

This menu shows the absolute maximum readings

Value	Meaning	Factory setting	Adjustable. range
Generator			
Gen power max	Maximum recorded power supplied at the *generator* input.	--	(read only)
Gen freq. min	Lowest frequency recorded at the *generator* input.	--	(read only)
Gen freq. max	Highest frequency recorded at the *generator* input.	--	(read only)
Gen voltage min	Lowest voltage recorded at the *generator* input. This value is always above *Gen. U low off* (see section 6.3.3).	--	(read only)
Gen voltage max	Highest voltage recorded at the *generator* input.	--	(read only)
Shore			
Shore power max	Maximum recorded power supplied at the *shore* input	--	(read only)
Shore freq. min	Lowest frequency recorded at the *shore* input.	--	(read only)
Shore freq. max	Highest frequency recorded at the *shore* input.	--	(read only)
Shore volt. min	Lowest voltage recorded at the *shore* input.	--	(read only)
Shore volt. max	Highest voltage recorded at the *shore* input.	--	(read only)
Inverter			
Inv freq. min	Lowest frequency recorded at the *inverter* input.	--	(read only)
Inv freq. max	Highest frequency recorded at the *inverter* input.	--	(read only)
Inv. volt. min	Lowest voltage recorded at the *inverter* input.	--	(read only)
Inv. volt. max	Highest voltage recorded at the *inverter* input.	--	(read only)

6.3.3 Menu level 3: Configuration

Value	Meaning	Factory setting	Adjustable. range
General			
Language	Language that is displayed on a monitoring device connected to the MasterBus	English	English/ Nederlands/ Deutsch/ Français
Device name	Name of this device. This name will be recognized by all connected devices	Systemswitch	0-12 chars
Generator			
Gen. U low on	Lower acceptance voltage for pass through of AC power at the *generator* input	205V	191-223V
Gen. U low off	Lower rejection voltage for pass through of AC power at the *generator* input	150V	124-177V
Gen. F low on	Lower acceptance frequency for pass through of AC power at the *generator* input	48Hz	41-60Hz
Gen. F low off	Lower rejection frequency for pass through of AC power at the *generator* input	43Hz	35-55Hz
Ignore gen freq.	If set to *On,* the *generator* input ignores the frequency of AC power at the *generator* input	Off	Off/On
Generator Power	Maximum power of the AC-source that is connected to the *Generator* input. In general, this is the nominal output power of the generator set.	6, 10 or 16kVA (model dependent)	0-16.0kVA
Names			
Shore name	Name of the AC input *Shore*	Shore	0-16 characters
Generator name	Name of the AC input *Generator*	Generator	0-16 characters
Auto load on inv.			
LOI gen load	The automatic load on inverter mode (see sections 3.6) will be triggered when the generator load exceeds this percentage (percentage of the *Generator Power* setting).	100%	0-100%
LOI gen delay	Time delay for the *automatic load on inverter mode* (see sections 3.6) caused by a generator overload. It prevents the *automatic load on inverter mode* being activated due to a short-time peakcurrent.	5s	0-30s
LOI generator	To enable the *automatic load on inverter mode* triggered by the generator load, this parameter must be set to “On”	Off	Off/On
LOI shore load	The automatic load on inverter mode (see sections 3.6) will be triggered when the shore load exceeds this percentage (percentage of the *Shore fuse* setting; see section 6.3.1)	100%	0-100%
LOI shore	To enable the *automatic load on inverter mode* triggered by the shore load, this parameter must be set to “On”	Off	Off/On
LOI runtime	When the *automatic load on inverter mode* is activated, it is switched off again when the adjusted time has elapsed.	120min	5-540min
Events			
Event x source	*Event-based command* (see section 5.2) Event by the *Mass Systemswitch* that should result in an action by one of the other devices on the MasterBus network		(See List of events, section 6.3.4)

Value	Meaning	Factory setting	Adjustable. range
Event x target	*Event-based command* (see section 5.2) Selection of device on the MasterBus network that should take action due to an event. by the *Mass Systemswitch*		(See *Device list* on the remote control panel)
Event x command	*Event-based command* (see section 5.2) Action to be taken by the selected device.		(See *List of event commands* in the manual of the selected device,)
Event x data	*Event-based command* (see section 5.2) Value of the action to be taken by the selected device.		(See *List of event commands* in the manual of the selected device,)
Art. nr Serial	Shows the article number and the serial number of the *Mass Systemswitch*		(read only)

6.3.4 List of event sources

Below the list of event sources of the *Mass Systemswitch* is shown. These event sources can be used to initiate an event command at an other device that is connected to the MasterBus

Event source	Description
Gen pre overload	Actual power at the *Generator* input is more than 80% of the *Generator power* setting (see section 6.3.3). This event is cancelled again when the power at the *Generator* input is less than 75% of the *Generator power* setting.
Gen. overload	Actual power at the *Generator* input is more than the *Generator power* setting (see section 6.3.3). This event is cancelled again when the power at the *Generator* input is less than 95% of the *Generator power* setting
Generator OK	AC power is available on the *generator* input and within specifications
Shore pre overld	Actual power at the *Shore* input is more than 80% of the *Shore fuse* setting (see section 6.3.1). This event is cancelled again when the power at the *Shore* input is less than 75% of the *Shore fuse* setting.
Shore Overload	Actual power at the *Shore* input is more than the *Shore fuse* setting (see section 6.3.1). This event is cancelled again when the power at the *Shore* input is less than 95% of the *Shore fuse* setting
Shore OK	AC power is available on the *Shore* input and within specifications
Pwr pre overload	Actual power connected to the *Power* output is more than 80% of the maximum allowed output current (see section 6.3.1, “Pwr src limit”) This event is cancelled when the actual power is less than 75% again.
Power overload	Actual power connected to the *Power* output is more than the maximum allowed output current (see section 6.3.1, “Pwr src limit”) This event is cancelled when the actual power is less than 95% again.
Power OK	AC power is available on the *Power* output and within specifications

6.3.5 List of event commands

With this version of the *Mass Systemswitch* programming of event commands at the *Mass Systemswitch* is not possible

6.3.6 Personal settings and notes

Use the table below to fill in your personal settings and notes

Value	Default	Personal setting
Load on Inv	Auto	
Device name	Systemswitch	
Gen. U low on	205V	
Gen. U low off	150V	
Gen. F low on	48Hz	
Gen. F low off	43Hz	
Ignore gen freq.	Off	
Generator Power	(model dependent)	
Shore name	Shore	
Generator name	Generator	
LOI gen load	100%	
LOI gen delay	5s	
LOI generator	Off	
LOI shore load	100%	
LOI shore	Off	
LOI runtime	120min	

7 ORDERING INFORMATION

7.1 TRADITIONAL REMOTE CONTROL PANELS

All below mentioned panels are suitable for remote monitoring and operation of the *Mass Systemswitch*

Model	System Manager AC	System Manager AC + Whisper	Power System Control panel 3 AC/DC	Power System Control panel 4 AC/DC + Whisper
Part number:	**70400015**	**70400020**	**70400030**	**70400040**
Application:	Monitoring by LCD display of AC voltage, frequency, current and kVA; LED bar display for kVA	Monitoring by LCD display of AC voltage, frequency, current and kVA; LED bar display for kVA; Remote operation of the Whisper generator.	Monitoring by LCD display of AC voltage, frequency, current and kVA; LED bar display for kVA; Battery monitoring. Remote operation of battery charger and inverter.	Monitoring by LCD display of AC voltage, frequency, current and kVA; LED bar display for kVA; Battery monitoring. Remote operation of battery charger, inverter and Whisper generator.
Mastervision compatible:	Yes	Yes	Yes	Yes
Automatic load on inverter mode:	Yes	Yes	Yes	Yes
Communication:	- - - - - - - - - - - - - - Traditional - 10 wires (not suitable for MasterBus) - - - - - - - - - - - - - -			
Dimensions (W x H):	120 x 195mm	120 x 195mm	240 x 195mm	240 x 195mm

7.2 MASTERBUS REMOTE CONTROL PANELS

Model	MasterView Classic	MasterView Easy	MasterView System
Part number:	**77010100**	**77010300**	**77010400**
Application:	Monitoring, control and configuration of MasterBus products by means of LCD display	Monitoring, control and configuration of MasterBus products by means of a 60x50 mm touch-screen LCD display	Monitoring, control, configuration and full automatic operation of MasterBus products by means of a 7”full colour TFT-touch-screen
Mastervision compatible:	Yes	No	No
Automatic load on inverter mode:	Yes	Yes	Yes
Communication:	MasterBus	MasterBus	MasterBus
Dimensions (W x H):	120 x 65mm	110 x 110mm	200 x 160mm

7.3 MASTERBUS INSTALLATION COMPONENTS

Part number	Description
77040000	MasterBus terminating device
77040020	MasterBus connection cable (UTP patch cable), 0,2m / 0.6ft
77040050	MasterBus connection cable (UTP patch cable), 0,5m / 1.6ft
77040100	MasterBus connection cable (UTP patch cable), 1,0m / 3.3ft
77040300	MasterBus connection cable (UTP patch cable), 3,0m / 10ft
77040600	MasterBus connection cable (UTP patch cable), 6,0m / 20ft
77041000	MasterBus connection cable (UTP patch cable), 10m / 33ft
77041500	MasterBus connection cable (UTP patch cable), 15m / 49ft
77042500	MasterBus connection cable (UTP patch cable), 25m / 82ft
77050000	100m / 330ft MasterBus cable (UTP cable)
77050000	50 pcs. modular jacks
77050000	Complete set to assemble UTP patch cables. Delivery includes: 100m / 330ft UTP cable, 50 pcs. modular jacks and crimping tool
77030100	MasterConnect USB interface, required as interface between your PC and the MasterBus when using MasterAdjust software.

7.4 MISCELLANEOUS

Part number	Description
120500300	Valox shore power inlet, 230V/16A,
120500400	Stainless steel shore power inlet, 230V/16A
120301000	Yellow moulded shore power cable 3x 2.5mm2, 25 meter
120300100	Yellow moulded shore power cable 3x 2.5mm2, per meter
120301400	Yellow moulded shore power cable 3x4mm2, per meter
6387000600	Double pole automatic circuit breaker DPN 6A-B, 1P+N
6387001000	Double pole automatic circuit breaker DPN 10A-B, 1P+N
6387001600	Double pole automatic circuit breaker DPN 16A-B, 1P+N
6387002500	Double pole automatic circuit breaker DPN 25A-B, 1P+N
6387003200	Double pole automatic circuit breaker DPN 32A-B, 1P+N
6385401610	Double pole automatic circuit breaker and earth leakage switch DPN VIGI 16A / B / 16mA, 1P+N
6385402510	Double pole automatic circuit breaker and earth leakage switch DPN VIGI 25A / B / 16mA, 1P+N
6385403210	Double pole automatic circuit breaker and earth leakage switch DPN VIGI 32A / B / 16mA, 1P+N
124001000	Shorefix, RCD (residual current device) 16Amp/B/30mA in cabinet

Mastervolt can offer a wide range of products for your electrical installation, including an extended program of components for your MasterBus network, Generator sets, shore power connections, isolation transformers, inverters, battery chargers and many more See our website www.mastervolt.com for an extensive overview of all our products

8 EC DECLARATION OF CONFIRMITY

Manufacturer Mastervolt
Address Snijdersbergweg 93
1105 AN Amsterdam
The Netherlands

Herewith declares that:

Product:

Product: Mass Systemswitch 6
Mass Systemswitch 10
Mass Systemswitch 16

Is in conformity with the following provisions of the EC:

EMC directive EMC 89/336/EEG and amendments 92/31/EEC and 93/68/EEC.
The following harmonised standards have been applied:
Generic emission standard: EN 50081-1:1992
Generic Immunity standard: EN 50082-1:1997

Safety directive 73/23/EEC and amendment 93/68/EEC, with the following standard:
Low voltage standard: EN 60950: 2000

Amsterdam,

R.J. ter Heide,
General Manager MASTERVOLT

NOTES

MASTERVOLT

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